Weekly Updates
PEAK FLOW FORECAST

FLOW EXTREMES, NOT SUPPLY

Peak flow forecasts are fundamentally different than water supply volume forecasts. Although the watershed snowpack is a principal component in both analyses, peak flows are not a supply question at all. Rather, peak flows characterize runoff extremes by predicting maximum mean daily flow at a single point during the spring snowmelt season. This extreme is related to the water supply volume, but the relationship is not direct or constant from year to year. As such, peak flow forecasts contain much more uncertainty than water supply volume forecasts.

REGULATED VS. NATURAL FLOWS

An even more fundamental limitation is that peak forecasts describe regulated (actual or observed) in-stream flow well into the future, something difficult to do considering the quantity and changing nature of diversions in the Colorado River and Great Basin watersheds. (Note: supply forecasts deal with hypothetical "natural" flow - that which would have resulted in the absence of regulation). The Colorado Basin River Forecast Center routinely forecasts regulated streamflow, but only for several days into the future. Further into the future the ability to forecast reservoir regulation becomes more limited.

DIFFERENT USES AND USERS

Peak flow forecasts are used for different purposes than water supply volume forecasts. Users of these forecasts would include river recreationists, flood control agencies, emergency service directors, wildlife managers and anyone interested in the combined effect of watershed yield and human regulation on the actual (observed) in-stream maximum mean daily flows at a site.

FLOOD FLOWS

The National Weather Service defines flood flow as the flow at which damage to structures begins to occur. Over-bank flow may occur but still be below the defined flood flow. Flood flows contained in this document change from year to year due to such channel processes as deposition and scouring. Therefore, the flood flows that follow should only be applied to the current runoff season. It should also be noted that they are instantaneous flows and not maximum mean daily flows. Forecast mean daily flows above the instantaneous flood flow will be highlighted in red.

IMPORTANT NOTE:

Please note that the following peak flow forecasts will be updated during the first week in May. The updated forecasts can be accessed through the CBRFC homepage (http://www.cbrfc.noaa.gov) or by calling the appropriate Service Hydrologist (see page 8 and 9).

INTERPRETIVE NOTES

PEAK FLOW DEFINED

The peak flow forecast represents the maximum mean daily flow (the highest average flow for an entire day during the runoff season) at a point during the April through July period, unless otherwise noted. It does not represent the instantaneous peak (the maximum flow at a single moment). In the case of smooth snowmelt regimes (hydrographs), it may be acceptable to approximate one with the other. In Arizona, the normal snowmelt period is from February to May. Occasionally, heavy rainfall events can produce higher peak flows than the snowmelt peak flows. For verification and calibration purposes, the maximum mean daily flow during the February through May period was used regardless of the runoff source. The Average Peak and Normal Time of Peak (defined as the average date of peak plus/minus one standard deviation which should include approximately 70% of the peaks) for a given gage are all derived from 1971 through 2000 data whereas the Historic Peak is derived from the period of record, including the most recent years, after reservoir regulation began.

FORECAST PROBABILITIES

Peak flow forecasts are presented in terms of probabilities or, more specifically, exceedance probabilities. The forecast labeled "most probable" is actually the 50% exceedance level meaning there are equal chances of being below the value or above the value (i.e., 50 chances out of 100 of being exceeded). The other exceedance probabilities associate the likelihood of exceeding other levels. In general, a close bunching of the exceedance forecasts indicates low variability and that the user can have a high degree of confidence in the forecast information. Conversely, a large spread in the exceedance forecasts indicates high variability.

MODELLING TECHNIQUES

The peak flow forecasts that follow have been derived using a combination of (1) physically-based conceptual models and (2) statistical regression models. The conceptual model is the National Weather Service River Forecasting System in the Ensemble Stream flow Prediction (ESP) mode. Since the conceptual model requires reservoir operation plans for up to five months into the future, ESP application is limited to basins where regulation is minimal (mostly in the headwater areas).
The farther downstream a forecast point is, the more likely it is that a statistical regression was used between natural snowmelt runoff volume and the observed maximum mean daily flow to generate the forecast. Such an approach performs better when the correlation between regulated and unregulated flow is strong and is constant from year to year.

GREAT BASIN PEAK FLOW FORECASTS

Mean daily flows in cubic feet per second (cfs)

STATION NAME	Historic Peak	Average Peak	Flood* Flow	2005 Peak	2005 Date	2006 Forecast Exceedance Probability 90%	75%	**50%**	25%	10%	Normal time of peak
BEAR - UTAH-WYOMING STATELINE, NR	2,680	1,610	4,400	1,820	5/04	1,380	1,480	**1,650**	1,800	1,920	5/22 - 6/14
LOGAN - LOGAN, NR, STATE DAM, ABV	1,870	985	1,360	1,230	5/25	1,100	1,150	**1,250**	1,380	1,500	5/18 - 6/10
BLACKSMITH FORK - HYRUM, NR, UP&L DAM	1,530	490	850	980	4/28			**700**	820	900	4/24 - 5/20
WEBER - OAKLEY, NR	4,170	1,625	2,400	1,620	6/18	1,250	1,550	**1,800**	2,100	2,300	5/24 - 6/16
CHALK CK - COALVILLE	1,420	600	1,900	720	5/21	450	650	**800**	920	1,000	5/5 - 5/31
PROVO - WOODLAND, NR	2,530	1,685	3,150	1,750	6/01	1,400	1,500	**1,600**	1,700	1,800	5/11 - 6/6
LITTLE COTTONWOOD CK - SALT LAKE CITY, NR	762	470	800	451	6/24	550	600	**640**	680	720	5/23 - 6/20
BIG COTTONWOOD CK - SALT LAKE CITY, NR	980	430	800	607	6/22	460	490	**530**	570	600	5/18 - 6/9
MILL CK - SALT LAKE CITY, NR	153	65	180	80	5/21	70	75	**85**	95	100	5/18 - 6/10
PARLEYS CK - SALT LAKE CITY, NR	605	180	350	187	5/21			**180**	230	280	4/23 - 5/22
EMIGRATION CK - SALT LAKE CITY, NR	164	55	130	42	5/18			150 CFS on 4/16			4/11 - 5/19
CITY CK - SALT LAKE CITY, NR	322	90	210	120	5/24	140	155	170	200	230	5/12 - 6/1
SEVIER - HATCH	1,740	495	1,200	1,740	6/03			**550**	600	700	5/6 - 6/2

N/A - NOT AVAILABLE (NOT A FLOOD FORECAST POINT OR NO FORECAST PROCEDURE EXISTS)